# ENGINEER'S REPORT

# PROPOSED IMPROVEMENTS FOR ZONE NW-1

# PROJECT NO. 10 035

# BARRON CREEK

SANTA CLARA COUNTY FLOOD CONTROL

AND

WATER CONSERVATION DISTRICT

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ENGINEER'S REPORT
FOR THE IMPROVEMENT OF BARRON CREEK
PROJECT NO. 10 035, ZONE NW-1 (NORTHWEST)

## INTRODUCTION

Barron Creek is located in northwest Santa Clara County and was formerly called Dry Creek. In order to avoid confusion with many other creeks of the same name, it has been renamed Barron Creek because the area southwest of El Camino Real, called Barron Park, is traversed by the stream.

Barron Creek formerly had a history of flooding in the Barron Park and Palo Alto areas prior to the October 1956 bond election. The monies obtained from that successful election were used to improve the stream from a point upstream of the Southern Pacific Railroad Company Vasona Branch to a confluence with Adobe Creek near Bayshore Highway.

Earlier improvement proposals did not include the upper reaches of Barron Creek because of the lack of development at the time; however, development is now progressing and being planned along these reaches which has precipitated this survey of the situation. The herein proposed improvements to the creek are recommended in order to prevent flooding of probable future developments as well as to minimize costs of right of way acquirement. An additional basis of need is the proposed widening of Arastradero Road which is closely paralleled by the creek from West Fremont Avenue easterly for about 1,800 feet. Damage to the roadbed in this reach has led to extensive repairs in both creek and road in the past, and additional repairs, riprap and retaining walls are needed at this time. Plan lines for the proposed road widening overlap the creek bed, thus necessitating extensive alteration of the creek alignment. An alternative solution will be discussed under the project description in this report.

This report (comprising this document and the maps and general construction plans attached hereto) shows:

1. A general description of the work proposed to be done, together with general plans, profiles, cross sections and general specifications relating thereto, on the project constituting the improvement.

2. A general description of the land, rights of way, easements, and property proposed to be taken, acquired or injured in carrying out said work.

3. Maps which show the location of the projects constituting the improvement, and land, rights of way, easements, and property to be taken, acquired, or injured in carrying out said work, and any information in regard to the same that is deemed necessary or useful.



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4. An estimate of the cost of the project constituting the improvement in Zone NW-1, which includes an estimate of the cost of the land, rights of way, easements, and property proposed to be taken, acquired, or injured in carrying out sai improvement, and also of all incidental expenses likely to be incurred in connection therewith, including legal, clerical, engineering, superintendence, inspection, printing, and advertising.

## WATERSHED DESCRIPTION

The watershed of the portion of Barron Creek concerned in this report lies almost wholly within the town of Los Altos Hills, with headwaters near the intersection of Purissima and La Paloma Avenues. From the latter point, the watershed quickly widens to approximately 4,500 feet which is the average width throughout the remainder of the shed to Junipero Serra Boulevard. The creek approximately bisects the watershed to Arastradero Road, where it turns and swings almost completely over to the easterly boundary of the watershed at the point where it crosses Junipero Serra Boulevard.

Numerous small tributaries of a local nature feed the stream as it traverses the watershed with one major tributary intersecting near the beginning of this project. The latter stream is called the East Branch of Barron Creek.

The improvement of about 200 feet of the East Branch and 9,000 feet of the main branch is proposed in this report.

## WATERSHED DEVELOPMENT

The entire portion of the Barron Creek watershed which is treated in this report lies in rolling hills, with a band along the westerly perimeter, averaging about 1,500 feet in width, being quite steep. There are also a few steep ridges along the easterly boundary of the watershed. These areas of steep terrain, if and when developed, will probably be of low density residential type. The remainder of the watershed lends itself to medium or low density residential development with the possibility of light industrial installations in the triangle formed by Arastradero Road, Junipero Serra Boulevard, and the westerly boundary of the watershed.

Zoning for the portion lying within the town of Los Altos Hills is currently for that of minimum lot size of one-half to one acre for each single residence and will probably remain so until the entire watershed reaches its full development.

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The beauty of the oak-studded hills, low density zoning and existing land costs tend to encourage the construction of residences in the Los Altos Hills City limits that are above the medium price class. The future development for schools and commercial areas will probably be along the generally accepted lines that are supplemental to such a residential area.

## BASIC CRITERIA

The criteria used in establishing preliminary design of structures, channels, and grades for the Barron Creek project are shown in the following table:

| | |
|---|---|
| Protection Level (design storm) | |
| Open Channels | 50-year frequency |
| Closed Conduits | 50-year frequency |
| Roughness Coefficients | |
| Large Reinforced Concrete Pipes | n = 0.013 (Manning) |
| Freeboard | |
| Subcritical Velocity in Earth Channel | 2 feet |
| Supercritical Velocity through Concrete Structures | Contains energy grade line within channel |
| Maximum Velocity in Earth Channel | 9.5 fps |

Peak Flow Computation

Overland Flow

C = 0.40 in all potentially developable land
0.30 in hilly portions of the upper watershed

I - Based on San Jose rainfall curve multiplied by a conversion factor of 1.5

The table below shows the watershed area and calculated peak runoff flows at each of several key points along the various reaches of the project:

## HYDROLOGIC DATA

### Barron Creek Main Branch

| Location | Watershed | Design Runoff |
|---|---|---|
| Fremont Avenue (Upper Crossing) | 154 Ac. | 74 cfs |
| Fremont Avenue (Lower Crossing) | 524 Ac. | 217 cfs |
| Arastradero Road | 639 Ac. | 236 cfs |
| East Branch Confluence | 784 Ac. | 288 cfs |
| Junipero Serra Boulevard | 1071 Ac. | 381 cfs |



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## East Branch

| Location | Watershed | Design Runoff |
|---|---|---|
| Main Branch Confluence | 287 Ac. | 105 cfs |

## PROJECT DESCRIPTION

It is proposed to place the East Branch in pipe from Arastradero Road to its confluence with the Main Branch because of the difficulty of constructing and maintaining an open channel through the existing trees and dairy farm corrals in this reach.

The Main Branch from the beginning of the project to the crossing of Arastradero Road will consist of improvement of the channel in its existing location. This will require riprap and, in the vicinity of station 15+00, it is proposed to replace an existing retaining wall, which is failing, with a short reach of underground pipe in order to protect the Arastradero Road bed. From the culvert at approximate station 21+50 to the point where the creek swings easterly away from West Fremont Avenue, considerable riprap work has been constructed in the past as a road protection program. Some of the riprap is in need of repair; this repair will become part of the current project.

As stated previously, there are plans to widen Arastradero Road as a part of the County Expressways building program. When such widening is done, the northerly boundary of the roadbed will extend over portions of the area now occupied by the creek bed. Considerable difficulty would be encountered in moving the creek northerly, so that it would remain outside the road right of way, because of the rapidly rising ground to the north. The County Road Department, therefore, has proposed to place the creek in closed conduit from station 10+00 to the culvert at station 21+50, and to pay the excess cost over that which would be incurred by the District if the improvements as proposed herein were carried out. Since all of the road widening will be on the northerly side of the right of way, the work proposed on the creek upstream from the Arastradero Road crossing would not be affected by the road work. However, the intersection of Arastradero Road and Fremont Avenue will eventually be a major interchange, and it may later be prudent to place the creek in underground conduit in the reach from station 21+50 to 35+00 under a similar cost sharing arrangement. The latter station marks the upstream end of the lower Fremont Avenue Crossing.

From station 35+00 to 48+30, it is proposed to improve the existing earth channel in approximately its existing alignment. From station 48+30 to 70+20, the channel has been improved to full design in conjunction with an adjacent subdivision development, and no additional work, with the exception of ordinary maintenance, is needed in this reach. In the final reach from station 71+00 to the upper crossing of West Fremont Avenue, the alignment as shown can be subject to change if found incompatible with future development of the area. It is not proposed to do more than necessary maintenance in this reach until such time as the contiguous property is developed.

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The tributary which borders Concepcion Avenue and is called Concepcion Creek is proposed to be placed underground to a junction with Barron Creek. As in the case of Barron Creek, the alignment of the pipe shown on the plan can be altered if found to be more compatible with a future development pattern.

## STAGING OF THE PROJECT

First stage construction will be from Junipero Serra Boulevard to the crossing of Arastradero Road at station 21+50, and will be performed in conjunction with the proposed widening of Arastradero Road in order to coordinate both construction and financing.

Work on the reach from station 21+50 to the existing improvements at station 48+30, except for maintenance, will be deferred until plans for the West Fremont Avenue-Arastradero Road intersection have been firmed up; this will preclude the performance of any work that may later be removed or altered on a major scale.

Construction of the final reach from station 71+00 to end of project, will be delayed until such time as adjacent development can be coordinated in order to assure best possible land utilization.

### Supplementary Maintenance

In addition to the construction shown on the plans, it may also be necessary to construct, on a maintenance basis, various erosion control facilities in several of the ravines in the upper reaches of the watershed. This will prevent high maintenance costs which follow the deposition of silt and detritus in improved downstream channels and pipes.

## PROJECT COSTS

In the following table the construction costs for all stages are based on current prices. Items included in contingencies are rights of way, engineering, advertising, legal fees, and all other incidentals:

| Stage No. | Station Limits of Stage | Const. Cost | Conting. Cost | Total Cost |
|---|---|---|---|---|
| I | 0+00 to 21+50 | $ 22,290 | $ 4,460 | $ 26,750 |
| II | 21+50 to 48+30 | 21,210 | 4,240 | 25,450 |
| III | 71+00 to 91+50 | 31,250 | 6,250 | 37,500 |
| | Total | $ 74,750 | $ 14,950 | $ 89,700 |



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After the final stages of the herein proposed projects have been completed, it is recommended that needed check dams be constructed on a maintenance basis. Construction of such erosion control structures can be delayed for a few years until financing is available or until local development begins to encroach upon the check dam sites.

## FINANCING

Since the Northwest Zone has a reasonably high assessed valuation and an adequate source of revenue from existing tax assessment, it is recommended that Barron Creek construction be staged in such a manner as to finance it on a pay-as-you-go basis from direct taxation without an increase in the rate. Construction of the first unit of the project (Stage 1) will be jointly financed by the District and the County Highway Department. The remaining reaches can be improved on a maintenance basis until such time as the improvements shown on the plans can be coordinated with adjacent land or road development and/or tax revenue is available.

## CONCLUSIONS AND RECOMMENDATIONS

Historical flooding on the reach of Barron Creek concerned in this report has been of a minor magnitude on private lands but considerable damage has been experienced on bridge and adjacent public roads. The County Highway Department proposes to widen Arastradero Road in an area which has frequently been damaged by flow in Barron Creek. Since the proposed road widening would cover the existing creek channel, the most feasible method of improvement consists of placing the creek in underground conduit; thus it will be necessary for the District to participate in a joint project with the County Highway Department for improvement of the reach adjacent and parallel to Arastradero Road.

Rapidly expanding development in this area may result in the building of expensive commercial and residential structures within the potential flood path. Furthermore, a delay in developing the channel would present the hazard of incurring higher costs for creek improvement if adjacent land development is allowed to constrict and/or infringe upon the needed channel right of way.

It is proposed to effect economies wherever possible by use of earth channel. In some reaches, the bottom of the channel has been designed of sufficient width to permit maintenance access thereon, which, in turn, reduces the width of right of way needed and conserves trees along the banks. In other reaches, the natural grades would cause erosive velocities in earth channel, but the proposed wide-bottom design combined with a series of drop structures will reduce velocities.

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Since the project is located in the Northwest Zone, which has a reasonably high assessed valuation, construction can go forward in stages without a great burden upon the tax payers.

It is therefore recommended that the Board of Supervisors hold a public hearing as required by law on this report and the accompanying plans, and that necessary action to expedite construction of this project be approved.

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